

# **NCEP Climate Guidance Products Users' Workshop**

**Sponsored by NOAA – National Weather Service (NWS)**

World Weather Building, Room 707  
5200 Auth Road.  
Camp Springs, MD 20746

December 2, 2004

## **1 Summary**

On December 2<sup>nd</sup>, 2004, NOAA's National Weather Service (NWS) will host a one-day users' workshop in the D.C. area on NWS National Centers for Environmental Prediction (NCEP) "*Climate Guidance Products*". The goal of the workshop is to determine the specific needs and requirements of private-sector providers, NWS international partners, and the research community that would enable them to develop value-added climate products and services, as well as improved climate forecast and monitoring tools and procedures, based on NWS's climate guidance products. Requirements gathered from the workshop will guide NCEP to prioritize its activities and allocation of its resources to develop capabilities to ensure that its partners can optimally benefit from its climate guidance products and related capabilities. Furthermore, this workshop aims to initiate an effective dialogue between NWS and providers of climate products and services to ensure that all challenges can be overcome through effective communication and collaboration.

## **2 Background**

### **2.1 What is NWS's Goal?**

To assess the interests as well as specific needs and requirements of private-sector providers, NWS international partners, and the research community for "climate guidance products" related to NCEP's dynamical and statistical forecasting systems used to develop week-two to short-term climate (seasonal) forecasts. This information will guide NCEP to prioritize its activities and allocation of its resources to develop capabilities to ensure that its partners can optimally benefit from its climate guidance products.

### **2.2 What are NCEP's Climate Guidance Products?**

Currently, NCEP operates three dynamical ensemble-based and a number of statistical forecasting systems for week-two to seasonal (short-term climate) forecasts. For purposes of this workshop, "Climate guidance products" refer to initialization fields, ensemble outputs, hindcast history, statistical model outputs, post-processing capabilities and other pre- and post-processing information related to these systems. While, the NCEP forecasting systems (dynamical and statistical) are supported by a variety of these capabilities, currently, there are no mechanisms to provide these climate guidance products operationally to NCEP's partners. However, it is recognized that if climate guidance products are available on an operational basis, this would enable NWS' partners to develop value-added climate products and services, as well as improved climate forecast and monitoring tools and procedures, based on these products. It is important to note that in this workshop we will not address issues related to "limits of predictability". We will address needs and requirements for climate guidance products associated with forecast time-scales that science can support at this stage (i.e., week-2 and seasonal).

In this section, we provide some background information on NCEP's model-based climate guidance products including links to critical web sites:

### 1. CDC Experimental Week-2 real-time ensemble-based forecast system

A 15-member ensemble is run every day at 00 UTC using a frozen version of the operational MRF, which was operational between January and June 1998. Forecasts with the same model and ensemble configuration are being run retrospectively for every day from November 1978 to the present as part of the **MRF Reforecast Project**.

For more information about this system and available guidance products such as hindcast history, ensemble outputs, etc., please see <http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/week2/>. A link on the bottom of the page titled "manuscript" leads to a PDF document of an article submitted to the Monthly Weather Review that provides a quite detailed account of the calibration procedure for this model.

To learn more about the concepts behind **MRF Reforecast Project** please see <http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/>.

CDC Currently represents the temperature and precipitation calibrated forecasts as separate above and below normal probability maps as follows:

[http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/stationfcsts/tavg\\_week2\\_latest\\_conus.html](http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/stationfcsts/tavg_week2_latest_conus.html)

[http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/stationfcsts/prcp\\_week2\\_latest\\_conus.html](http://www.cdc.noaa.gov/people/jeffrey.s.whitaker/refcst/stationfcsts/prcp_week2_latest_conus.html)

CDC also provides ascii output of their forecasts as [ftp://ftp.cdc.noaa.gov/Public/jsw/refcst/tavg\\_pentad2.latest](ftp://ftp.cdc.noaa.gov/Public/jsw/refcst/tavg_pentad2.latest)

The ascii file is converted to GEMPAK format and present the data as total probabilities on one map color coded by dominant category. Examples of these maps (when available) can be found as follows:

[http://www.cpc.ncep.noaa.gov/products/predictions/short\\_range/tools/cdc.pub.html](http://www.cpc.ncep.noaa.gov/products/predictions/short_range/tools/cdc.pub.html)

The surface forecasts are also verified and compared to some of other statistical tools and NCEP's official forecasts. CDC's 6-10 Day temperature skill map along with manual and automated forecasts for the last 30 days are being developed.

### 2. EMC Week-2 Global Ensemble Forecast System

The NCEP Global Ensemble Forecast System uses the best available initial condition (SSI analysis) and the latest version of the GFS forecast model. The SSI initial conditions are perturbed, using the breeding method, to generate 10 perturbed initial conditions, with the aim of representing uncertainty in the initial conditions. Each of the 10 perturbed analysis field is then integrated with the T126, L28 version of the GFS system out to 180 hrs, after which point, for the sake of computational efficiency, a truncated, T62 L28 version of the same model is used to complete the forecasts out to 16 days. The 10-member ensemble runs four times a day, initialized at 00Z, 06Z, 12Z, and 18Z, producing, with the GFS high resolution unperturbed forecast and a low resolution ensemble control forecast (the latter only at 00Z) a total of 45 forecasts per day. Most forecast fields are made available to the user community on anonymous ftp sites on a 1x1, or 2.5x2.5 regular lat/lon grid, in GRIB format, at 6-hourly time resolution. In addition, a limited number of derived products, e.g., ensemble mean, spread, PQPF are also made available operationally as gridded fields, and some others (e.g., spaghetti, storm tracks, and Relative Measure of Predictability -RMOP) as graphics on non-operational web sites. Currently, bias corrected fields, based on performance statistics over the most recent 30-60 day period, are available only for QPF and PQPF. As part of the development of the North American Ensemble Forecast System (joint work with the Meteorological Service of Canada, where ensembles from the two centers will be merged, many additional, bias-corrected products will become operationally available in the coming years. For additional information, see

[http://www.emc.ncep.noaa.gov/gmb/ens/info/ens\\_backgrd.html](http://www.emc.ncep.noaa.gov/gmb/ens/info/ens_backgrd.html)

### 3. CPC dynamical Climate Forecasting System (CFS)

A detailed description of the CFS and related climate guidance products can be found at:

[http://www.emc.ncep.noaa.gov/gmb/ssaha/cfs\\_data](http://www.emc.ncep.noaa.gov/gmb/ssaha/cfs_data)

and Click on CFS.ppt for a detailed PowerPoint presentation.

More information about CFS can be obtained at:

[http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/index\\_pri.html](http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/index_pri.html)

#### 4. CPC statistical forecasting system:

CPC operates several statistical models such as CCA, The three statistical tools are based on the canonical correlation analysis (CCA)<sup>1</sup>, optimal climate normals (OCN)<sup>2</sup>, and Soil Moisture Tool (SMT) techniques. CCA models linear relationships between the fields of predictors (e.g., seasonal mean temperature and precipitation) based upon patterns of global SST, surface temperature and precipitation from the past years for the most recent non-overlapping seasons. CCA predicts ENSO patterns but only based on linear relationships and can also account for other low frequency modes such as the impacts of long-term trends in SST anomaly on the surface air temperature and other atmospheric variables. The OCN method predicts temperature and precipitation based on the persistence of the observed average anomalies for a given season during the last ten years for temperature and the last 15 years for precipitation; thus, emphasizing the long-term trend in these atmospheric variables. Information related to these models can be found at:

[http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/index\\_pri.html](http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/index_pri.html)

Please note that all systems except for one of the 15-day ensemble runs are currently supported by at least a 20-year hindcast set.

### 2.3 Why this workshop?

To ensure that NCEP's partners can optimally benefit from NCEP's climate guidance products, NCEP/NWS needs to identify and evaluate its partners' specific needs and requirements for these products. For this purpose, NCEP/NWS is hosting a workshop to provide an opportunity to its partners to discuss their specific needs and requirements for NCEP's climate guidance products and systems. This information will help NCEP to prioritize its activities and allocate appropriate resources with regards to development of its capabilities to provide climate guidance services to its public and private partners, operationally.

For each of the climate guidance products discussed above, we aim to address specific requirements for the four specific areas outlined below.

1. What are your requirements for the climate guidance systems in quasi-real time?
  - What fields/outputs in quasi real-time
  - What frequency, what regions, etc.
  - Raw vs. post-processed output (ensemble runs, etc.)
  - Other
2. What kind of model performance information is needed to support the use of the forecasts produced from the output of the models?
  - Hindcast histories, and other requirements for hindcast runs (20 years or 30 years or more than that)
  - Suite of verification statistics
  - etc.
3. What are your requirements for protocol for changing the models?
  - How far in advance you need to be informed of the change
  - Do you need specific information about the nature of the change and implication for the model outcome
  - How far in advance do you need the supporting verification information, such as hindcasts and suite of verification statistics?
  - How often can you tolerate a major upgrade to the system?

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<sup>1</sup> For more information see, A. G. Barnston (1994). "Linear Statistical Short-term Climate Prediction Skill in the Northern Hemisphere," *Journal of Climate*, Vol. 7: 1513-1564.

<sup>2</sup> For more information see, J. Huang, H. M. van den Dool, and A. G. Barnston (1996). "Long-lead Seasonal Temperature Predictions Using Optimal Climate Normals," *Journal of Climate*, Vol. 9: 809-817.

4. Transfer of guidance technology (Please note that the discussion of the model testbed facility is out of the scope for this workshop)

## **2.4 Who is invited?**

Lead technical and scientific experts from four groups are invited to this workshop:

1. Private sector (commercial providers)
2. Research Partners - IGES/COLA, Climate Diagnostic Center, Other interested ARC partners
3. Operational Partners - International Research Institute for Climate Prediction (IRI) and the Canadian Meteorological Center– Note: NOAA is beginning to collaborate with CMC to combine model system outputs for developing joint ensemble for North America
4. International partners and WMO Regional Climate Centers – Representative of WMO RCC Program (RA-IV and V) and a member of the Expert team for standardized verification system for long-range forecasts (Lead centers are Australia and Canada). Please note that more information about WMO's requirements can be found at <http://www.wmo.ch/web/www/DPS/LRF/LRF-verification-systems.html>. These can serve as a guidance for this workshop.

## **2.5 What are the benefits?**

This workshop provides members of commercial providers and research community with the opportunity to influence the steps that NCEP will be taking in the next several years to provide critical climate guidance products on an operational basis. Specifically, NCEP will utilize the information collected during this workshop to help prioritize key activities to allocate appropriate resources to ensure that it successfully provides climate guidance products to its private and public sector partners operationally. Furthermore, this workshop aims to strengthen the dialogue and collaborations between NCEP/NWS, non-government providers of climate products and services and the research community to ensure that all challenges can be overcome and the benefits of these products are most effectively realized.

## **3 What are the deliverables?**

Following the meeting, Dr. Golnaraghi will work with Dr. Livezey to document the outcomes of the workshop and will provide all participants a copy for final comments and revisions. This report, which will be submitted to AMS Bulletin for publication, will serve as the document to guide NCEP/NWS's to prioritize its activities and allocate appropriate resources with regards to development of its capabilities to provide climate guidance services to its public and private partners, operationally.

#### **4 Workshop Draft Agenda**

9:00-10:30

9:00-9:30

Welcome

Opening remarks, format, Goals and specific questions to address (Bob Livezey)

9:30- 10:30

NOAA/NWS/NCEP background information on guidance products (Four 15-minute presentations by NOAA scientists and forecasters on climate guidance products associated with NOAA/NWS/NCEP forecast systems)

10:30-10:45

Coffee Break

10:45- 12:15

Six 15-minute presentations by NCEP partners (3 private sector, 2 research, 1 operational)

12:15 – 13:30

Lunch (Speaker to present on testbed transition services)

13:30 – 15:00

Breakout sessions (by four foci under 2.3, with participants from private sector, research and operational and international partners) – Each session will have a designated leader and a rapporteur. The leader will present the session's outcomes in the joint panel later on

15:00 – 15:15

Coffee Break

15:15 – 16:30

Joint panel (Leaders of each breakout session)

16:30- 17:00

Concluding remarks and closing of the session

#### **5 Workshop Date and Locations**

**Date:** December 2, 2004

**Location:**

World Weather Building, Room 707

5200 Auth Road.

Camp Springs, MD 20746

#### **6 Workshop Registration**

To register, please email your confirmation for participation along with the following information to Dr. Maryam Golnaraghi at [Maryam@theworld.com](mailto:Maryam@theworld.com), before November 12, 2004.

In your email please include:

Name:

Title:

Organization:

Address:

Telephone:

Fax:

Email:

#### **7 Workshop Information**

For agenda updates please visit our website at:

<http://www.nws.noaa.gov/om/csd/workshop/Guidance05/>

## 8 Workshop Contacts

For more information on the goals, agenda and format of the workshop please contact workshop facilitators:

1. Dr. Maryam Golnaraghi  
Former president and founder of Climate Risk Solutions Inc.  
Dr. Golnaraghi recently joined WMO as the Chief of WMO's Natural Disaster Mitigation and Prevention Program  
Tel. (617) 794-5241 (US)  
Tel. (41-79) 530-3213 Geneva, Switzerland)  
Email. [Maryam@climaterisksolutions.com](mailto:Maryam@climaterisksolutions.com)
2. Dr. Robert Livezey  
Chief, Climate Services Division/Office of Climate, Water, and Weather Services/NWS/NOAA  
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For more information on workshop logistics, please contact:

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NOAA/NWS Climate Services Division  
Tel. (301) 713-1970 Ext. 181  
[Barbara.Mayes@noaa.gov](mailto:Barbara.Mayes@noaa.gov)

## 9 Suggested Locations for Accommodations

1. Marriott Wardman Park  
2660 Woodley Road NW  
Washington, DC  
(202) 328-2000
2. Marriott Metro Center  
775 12th Street NW  
Washington, DC  
(202) 737-2200
3. Courtyard By Marriott  
900 F Street NW  
Washington, DC 20004  
(202) 638-4600
4. Holiday Inn Capitol  
550 C Street SW  
Washington, DC 20024  
(202) 479-4000